

Climate Change EE curriculum-based activities

ACTIVITY 3 *What happens in Antarctica / Greenland doesn't stay in Antarctica / Greenland.*

Learn how sea level changes occur. *NB: There's a huge difference between ice bergs and ice sheets.*

OBJECTIVES To understand the connection between melting terrestrial ice and rising sea level.

- 1) State / show that FL has been underwater many times in the "recent" geologic past.
- 2) Demonstrate what happens when ice bergs or the Arctic sea ice melts(nothing happens to sea level).
- 3) Show what happens when ice sheets melt (sea level rises).
- 4) Connect sea level changes in Miami to ice-sheets melting far away.
- 5) Explain that FL has had sea level changes caused by melting and freezing of ice sheets in Antarctica and Greenland.
- 6) Show that human communities, and FL is / will be affected by sea level rise.
- 7) Talk about ways to mitigate / prepare for / adapt to the melting of ice-sheets.

MATERIALS

- 1) Two shallow, large containers of the same size to be used concurrently to show effects of (i) melting of icebergs and (ii) melting of ice sheets
- 2) Lots of Playdoh, fish gravel or some kind of material that can be re-used by kids to build their own "Florida" inside the shallow containers.
- 3) Three upside down plastic bowls of the same size (eg MacDonald's salad bowls). Have a hole pre-punched into each salad bowl.
- 4) Materials like plastic buildings, animals, trees, etc-that can be put on top of the salad bowls.
- 5) Exact same amounts of water to be poured into the two shallow containers. (1 gallon milk jugs).
- 6) Exact same amounts of ice to be used in two experiments (about ½ gallon ice –use two McDonald's salad bowls to freeze the water).
- 7) Waterproof tape to stick the upside down salad bowls onto the shallow containers.
- 8) Rulers to measure sea-level rise in both the containers.
- 9) Map / globe of the world.
- 10) Pictures to show ancient geography of FL with different sea levels.

PROCEDURES – aim to show sea levels change in Florida due to melting ice sheets far away.

- 1) Have kids find the Arctic ice caps (not a land mass), Greenland and Antarctica (both are big landmasses covered in ice) and S. FL on the globe. Explain the differences between Arctic icebergs, and Antarctica /Greenland. Explain that Antarctica ice is land and the Arctic ice caps are floating in the ocean. Antarctica is cover by tens of thousands of feet of ice Let them compare the size of Antarctica with the USA. Talk about icebergs being in the water and ice sheets being on land. Use stats to show the amounts of ice in both locations. Also talk about how S. FL water level has fluctuated throughout history.

- 2) Divide the students into two groups (#1: effects on Florida of ice bergs melting in Arctic icecaps, #2 : effects on Florida of ice sheets melting in Antarctica). Give each group a clear plastic container, two upside-down salad bowl, plastic toys, playdoh, gravel.
- 3) Tell each group that they are going to find out how environments are connected to each other through climate change.
- 4) Attached one upside down salad bowls to the bottom of container #1 – this one bowl is Florida.
- 5) Attached two upside down salad bowls to the bottom of container #2 – one bowl is Florida, the other bowl is Antarctica. Having a hole pre-punched into the salad bowls allows them to sit in the water better.
- 6) Have the students on group #2 pick an upside bowl to represent Florida.
- 7) Pour equal amounts of water into container #1 and #2 – this is the ocean. Pour the water so that it stops about ½ inch from the top of the upside bowls.
- 8) Add the ice for container #1 to container #1 only. The water level will rise a bit – try to have the water no more than ¼ inch from top of the bowl. All this will depend on the amount of ice you're using and the size of the container.
- 9) Have students on both groups mark this water level / sea level with a dry erase marker on the side of their "Florida" bowl
- 10) Using the materials provided, have each groups create their own FL on their bowl. (Houses, animals, cities, etc). Make sure the city of Miami on the coastline.
- 11) For group #2-place their block of ice on top of the second bowl. This represents all the ice sheets on top of landmasses like Antarctica and Greenland.
- 12) Wait for ice to melt in both containers(go do another activity and come back) or place a heat lamp acting as the sun over the Ice Bergs in #1and Ice Sheets in #2 until the ice is melted.
- 13) Look at the water level marks in both containers; is the water level higher, lower, or the same? (It will be the same in the Ice Bergs in #1 and higher in the Ice Sheet in #2). What happened to their cities etc as the water came up in #2?
- 14) Have students in the Ice Sheet in #2 group mark and measure the new water line, so they can determine how much the water had risen.
- 15) Explain that climate change will affect Northern environments and Southern environments. Ice begs melting won't raise sea level, but ice sheets on land will raise sea level.
- 16) Compare and contrast the effect of melting ice bergs and melting ice sheets. (if the ranger while setting up the activity saw ice cubes in the water displaced the water level by one inch – then all things being equal, the ice sheet melting should have flooded the continents by one inch too).Probably the kids harbors, beaches, resorts, Miami, etc are now underwater. Water in the ocean no matter what form (solid, liquid, or gas) has the same amount of volume, however, ice on land will only add more water to the ocean.
- 17) Reintegrate that climate change will not flood FL over night, but historically there has been a pattern of flooding in S. FL.
- 18) If sea level has risen in FL before –what's different about it this time (Millions of people life here now.)
- 19) Not only may climate change affect us here in S. FL, but what about other places?

ASK THE FOLLOWING KINDS OF QUESTIONS

Does what happens in Antarctica doesn't stay in Antarctica? Why?

Why did this happen? Why didn't the icebergs melting cause a higher sea level?

What other places is ice melting on land (glaciers)?

What happens to you if you lived / hunted on the arctic now it's melting? (You lost your habitat – polar bears / Inuit cultures).

What's more of a problem – melting Arctic icebergs, or melting ice on Antarctica / Greenland?

Can you find other places in the map where rising sea level will flood the coastline (Florida, Bangladesh, Venice, the Maldives, Tuvalu, Kiribati other Pacific Islands)

Will this happen overnight, or over your life time?

What can you do to plan / mitigate / adapt for this?

How much has the sea level at EVER rises in past 100 years ?

What's causing ice sheets to melt?

If sea level has risen in FL before –what's different about it this time (Millions of people live here now.)

<http://www.epa.gov/climatechange/kids/impacts/effects/coastal.html>